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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/631,921	07/31/2003	Jigish D. Trivedi	MICRON.104DV1	9664

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EXAMINER

POMPEY, RON EVERETT

ART UNIT	PAPER NUMBER
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2812

DATE MAILED: 09/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/631,921

Applicant(s)

TRIVEDI, JIGISH D.

Examiner

Ron E Pompey

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 June 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okumura (US 4,935,380) in further view of the admitted prior art (APA) and Yoo (US 5,605,854).

Okumura discloses the limitations of:

forming a gate stack on a substrate, the gate stack having at least one conductive layer (205, fig. 7B) and a source layer (213, fig. 7B) positioned on top of the at least one conductive layer, the source layer providing a source of transforming atoms (col. 6, ln. 59 – col. 7, ln. 9).

3. Okumura fails to disclose the limitations of:

exhuming a first layer of the gate stack so as to expose a portion of the source layer;

depositing a refractory material on the integrated circuit so that the refractory material contacts the exposed portion of the source layer of the gate stack and so that the refractory material is positioned on another device of the integrated circuit;

transforming the refractory material at the exposed portion of the source layer into a low resistance contact wherein the source layer provides transforming atoms to

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the portion of the refractory material positioned adjacent the exposed portion of the source layer; and

wherein annealing the refractory material comprises exposing the refractory material to a rapid thermal processing environment having an N₂/NH₃ ambient so as to increase the temperature of the refractory material to a value between 600 degrees Celsius and 750 degrees Celsius for a period of time between 10 seconds and 60 seconds.

a. However, the admitted prior art discloses:

exhuming (202, fig. 1) a first layer (216, fig. 1) of the gate stack so as to expose a portion of the source layer;

depositing a refractory material (218, fig. 1) on the integrated circuit so that the refractory material contacts the exposed portion of the source layer of the gate stack and so that the refractory material is positioned on another device of the integrated circuit; and

transforming the refractory material at the exposed portion of the source layer into a low resistance contact wherein the source layer provides transforming atoms to the portion of the refractory material positioned adjacent the exposed portion of the source layer (pg. 1, ln. 28 – pg. 2, ln. 28).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine the admitted prior art with Okumura, because the first layer protects the gate structure from subsequent process and the refractory material provides an electrical connection between circuit nodes in an integrated circuit.

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b. However, Yoo discloses:

wherein annealing the refractory material comprises exposing the refractory material to a rapid thermal processing environment having an N₂/NH₃ ambient so as to increase the temperature of the refractory material to a value between 600 degrees Celsius and 750 degrees Celsius for a period of time between 10 seconds and 60 seconds (col. 4, lns. 43-67).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Yoo with Okumura and the admitted prior art, because rapid thermal processing has less effect on the doping concentrations set in the previous process due to less prolonged heat treatment.

Response to Arguments

4. Applicant's arguments filed June 7, 2004, pertaining claims 1-25, have been fully considered but they are not persuasive. The applicant argues that "... Okumura does not discuss the concept of transforming the refractory metal in the exposed portion of the source layer into a low resistant contact that is positioned between the refractory metal and the source layer such that electrical contact between the refractory metal and at least one conductive layer occurs through the source layer. In particular, Okamura teaches away from electrical contact occurring through the source layer in the manner claimed as in Figure 7E and at Column 8, Lines 5-8, an oxide in the Okamura reference is formed from and on the corresponding source layer which therefore teaches away from providing electrical contact through the source layer."

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5. First, the above rejection states that the admitted prior art (APA) addresses the deficiency of Okumura in regard to exposing an source layer (213, figure 7B; Okumura), replace the respective gate stack layers 204, 205 and 213, figure 7B (of Okumura) with the gate stack layers 214 and 210, figure 1 (of the APA), and transforming a refractory metal (218, figure 1; APA) into a low resistant contact. Therefore, because the applicant does not argue about the combination of Okumura and APA the rejection regarding the transforming the refractory metal in the exposed portion of the source layer into a low resistant contact is upheld.

6. Second, Okumura does not teach away from electrical contact occurring through the source layer. Okumura forms an insulating or capping layer on the source layer similar to the capping layer (216, figure 1; APA). This capping layer is exhumed in the APA to allow for electrical contact to the source layer by the refractory layer. Also, as described above the gate stack of 7B is the embodiment that is being used in the rejection of the claims.

Claim Objections


7. Claims 1 and 20 objected to because of the following informalities: the new claim language has the word "level" and I think it should be layer. Appropriate correction is required.

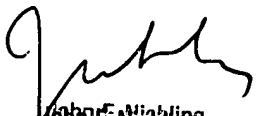
Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ron E Pompey whose telephone number is (571) 272-1680. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.


Ron Pompey
AU: 2812
September 17, 2004


John F. Niebling
Supervisory Patent Examiner
Technology Center 2800